# MICROWAVE OVEN

**CE979GSE**

# SERVICE Manual

MICROWAVE OVEN

CONTENTS

1. Precautions

2. Specifications

3. Operating Instructions

4. Disassembly and Reassembly

5. Alignment and Adjustments

6. Circuit Description

7. Troubleshooting

8. Exploded Views and Parts List

9. PCB Diagrams

10. Schematic Diagrams

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# PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(a) Do not operate or allow the oven to be operated with the door open.
(b) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
(1) Interlock operation,
(2) proper door closing,
(3) seal and sealing surfaces (arcing, wear, and other damage),
(4) damage to or loosening of hinges and latches,
(5) evidence of dropping or abuse.
(c) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, wave guide or transmission line, and cavity for proper alignment, integrity, and connections.
(d) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
(e) A Microwave leakage check to verify compliance with the Federal performance standard should be performed on each oven prior to release to the owner.

# 1. Precaution

Follow these special safety precautions. Although the microwave oven is completely safe during ordinary use, repair work can be extremely hazardous due to possible exposure to microwave radiation, as well as potentially lethal high voltages and currents.

## 1-1 Safety precautions ( ⚠ )

1. All repairs should be done in accordance with the procedures described in this manual. This product complies with Federal Performance Standard 21 CFR Subchapter J (DHHS).

2. Microwave emission check should be performed to prior to servicing if the oven is operative.

3. If the oven operates with the door open : Instruct the user not to operate the oven and contact the manufacturer and the center for devices and radiological health immediatly.

4. Notify the Central Service Center if the microwave leakage exceeds 5 mW/cm$^2$

5. Check all grounds.

6. Do not power the MWO from a "2-prong" AC cord. Be sure that all of the built-in protective devices are replaced. Restore any missing protective shields.

7. When reinstalling the chassis and its assemblies, be sure to restore all protective devices, including: nonmetallic control knobs and compartment covers.

8. Make sure that there are no cabinet openings through which people--particularly children--might insert objects and contact dangerous voltages. Examples: Lamp hole, ventilation slots.

9. Inform the manufacturer of any oven found to have emmission in excess of 5 mW/cm$^2$, Make repairs to bring the unit into compliance at no cost to owner and try to determine cause.
   Instruct owner not to use oven until it has been brought into compliance.

**CENTRAL SERVICE CENTER**

10. Service technicians should remove their watches while repairing an MWO.

11. To avoid any possible radiation hazard, replace parts in accordance with the wiring diagram. Also, use only the exact replacements for the following parts: Primary and secondary interlock switches, interlock monitor switch.

12. If the fuse is blown by the Interlock Monitor Switch: Replace all of the following at the same time: Primary and secondary switches, as well as the Interlock Monitor Switch. The correct adjustment of these switches is described elsewhere in this manual. Make sure that the fuse has the correct rating for the particular model being repaired.

13. Design Alteration Warning:
    Use exact replacement parts only, i.e., only those that are specified in the drawings and parts lists of this manual. This is especially important for the Interlock switches, described above. Never alter or add to the mechanical or electrical design of the MWO. Any design changes or additions will void the manufacturer's warranty.10.Always unplug the unit's AC power cord from the AC power source before attempting to remove or reinstall any component or assembly.

14. Never defeat any of the B+ voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.

15. Some semiconductor ("solid state") devices are easily damaged by static electricity. Such components are called Electrostatically Sensitive Devices (ESDs). Examples include integrated circuits and field-effect transistors.

    Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground.

16. Always connect a test instrument's ground lead to the instrument chassis ground *before* connecting the positive lead; always remove the instrument's ground lead last.

## 1-2 Special Servicing Precautions (Continued)

17. When checking the continuity of the witches or transformer, always make sure that the power is OFF, and one of the lead wires is disconnected.
18. Components that are critical for safety are indicated in the circuit diagram by shading, ⚠ or ⚠ .
19. Use replacement components that have the same ratings, especially for flame resistance and dielectric strength specifications. A replacement part that does not have the same safety characteristics as the original might create shock, fire or other hazards.

## 1-3 Special High Voltage Precautions

1. High Voltage Warning
   Do not attempt to measureany of the high voltages--this includes the filament voltage of the magnetron. High voltage is present during any cook cycle.

   Before touching any components or wiring, always unplug the oven and discharge the high voltage capacitor (See Figure 1-1)

2. The high-voltage capacitor remains charged for about 30 seconds after disconnection. Short the negative terminal of the high-voltage capacitor to to the oven chassis. (Use a screwdriver.)

3. High voltage is maintained within specified limits by close-tolerance, safety-related components and adjustments. If the high voltage exceeds the specified limits, check each of the special components.

Fig. 1-1. Discharging the High Voltage Capacitor

# 2. Specifications

## 2-1 Table of Specifications

| | |
|---|---|
| TIMER | 99Mins |
| POWER SOURCE | 230V 50Hz, AC |
| POWER CONSUMPTION | MICROWAVE : 1,500W |
| | MAX : 1,500W |
| | GRILL : 1,300W |
| OUTPUT POWER | FROM 85W TO 850W (10 LEVEL POWER) |
| | (IEC-705 TEST PROCEDURE) |
| OPERATING FREQUENCY | 2,450MHz |
| MAGNETRON | OM75PH(31)ESS |
| COOLING METHOD | COOLING FAN MOTOR |
| OUTSIDE DIMENSIONS | 517(W) x 340H) x 435(D) |

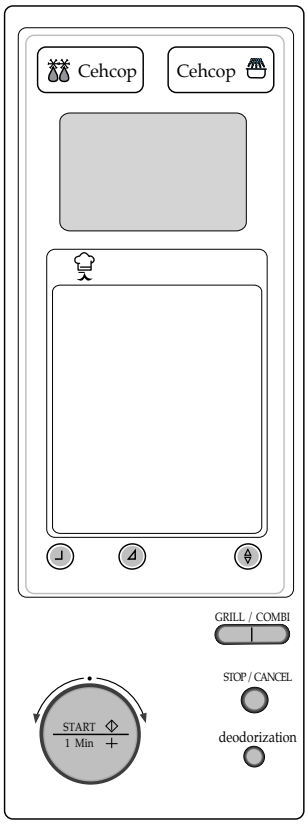
| POWER LEVEL | | ON TIME | OFF TIME |
|---|---|---|---|
| % | CE979GSE | | |
| 10% | 85W | 4 sec | 26 sec |
| 20% | 170W | 7 sec | 23 sec |
| 30% | 255W | 10 sec | 20 sec |
| 40% | 340W | 13 sec | 17 sec |
| 50% | 425W | 16 sec | 14 sec |
| 60% | 510W | 19 sec | 11 sec |
| 70% | 595W | 22 sec | 8 sec |
| 80% | 680W | 25 sec | 5 sec |
| 90% | 765W | 28 sec | 2 sec |
| 100% | 850W | 30 sec | 0 sec |

## 2-2 Comparison Chart

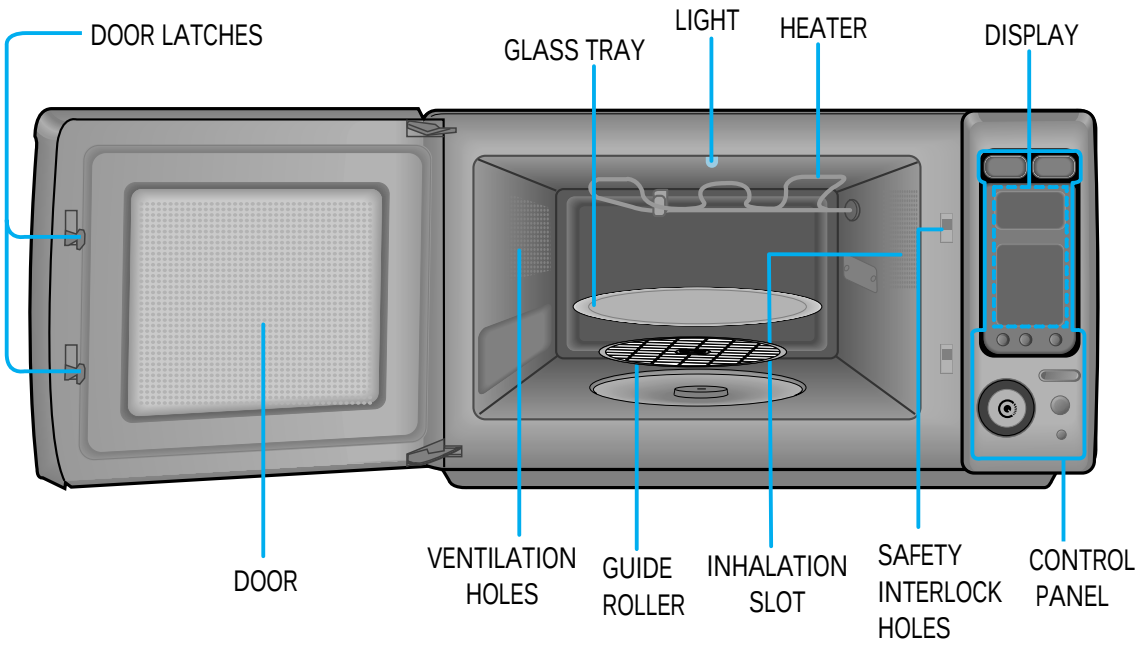
| MODEL / FEATURE | CE979GSE |
|---|---|
| MORE/LESS | O |
| AUTO COOK/DISH | O |
| AUTO DEFROST | O |
| AUTO REHEAT | O |
| TIME COOK | O |
| POWER LEVEL | O |
| GRILL | O |
| MICROWAVE/GRILL | O |

# 3. Operating Instructions

## 3-1 Control Panel




## 3-2 Features & External Views



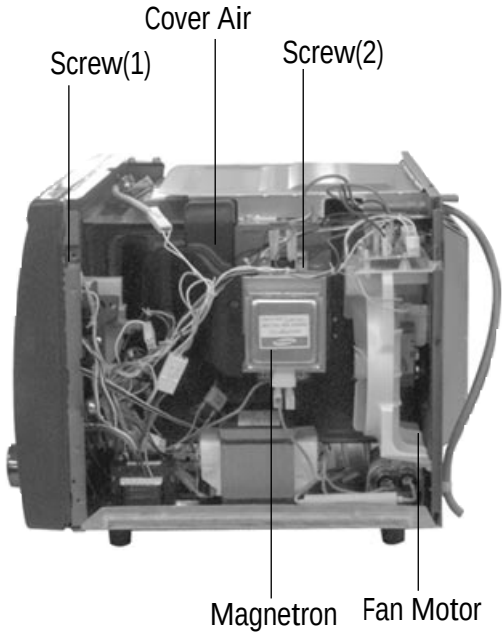
# 4. Disassembly and Reassembly

## 4-1 Removal of Outer Panel

1. Remove five screws from the rear section.
2. Lift the outer panel by pulling it backwaeds

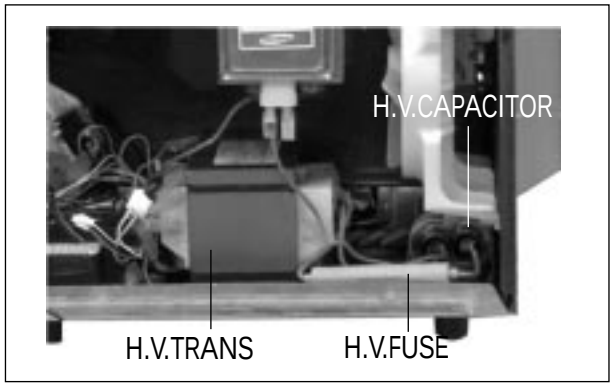
## 4-2 Replacement of Magnetron and Fan Motor

1. The magnetron incudes the shield case, permanent magnet, check coils and 500pF capacitors (all contained in one assembly).
2. Discharge the high voltage capacitor. (See page1-2)
3. Disconnect all lead wires from the magnetron.
4. Remove screw(1) securing the magnetron supporter.
5. Remove the magnetron supporter.
6. Remove the air cover
7. Remove screws(2) securing the thermal cutout switch.
8. Remove screws securing the magnetron to the wave guide.
9. Remove the magnetron very carefully.
10. Remove screws from the back panel to take out fan motor.
11. When removing the magnetron, make sure that its antenna does not hit any adjacent parts.
12. When replacing the magnetron, be sure to remount the magnetron gasket in the correct position, and make sure the gasket is in good condition.



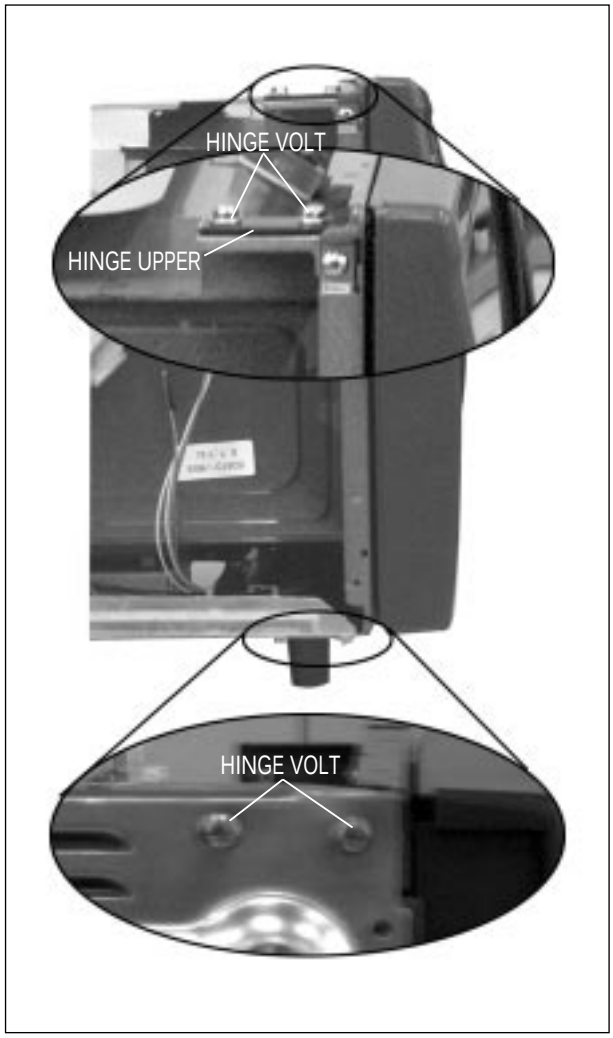
## 4-3 Replacement of High Voltage Transformer

1. Discharge the high voltage capacitor. (See page 1-2)
2. Disconnect all the leads.
3. Remove four screws.
4. When replacing, connect the leads securely.



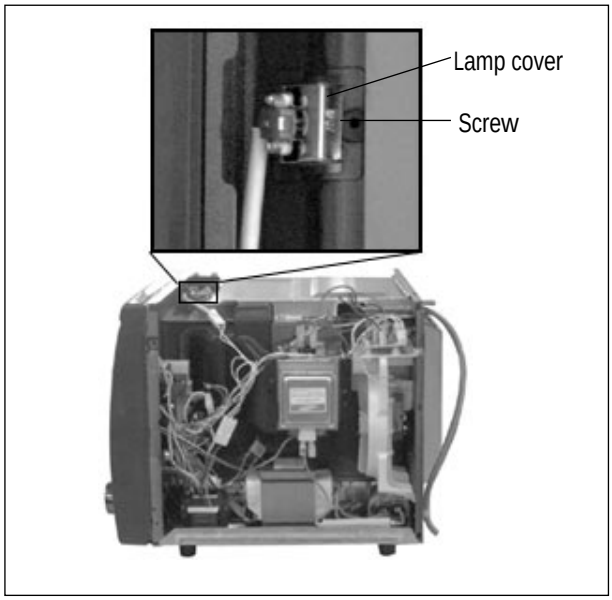

## 4-4 Replacement of Door Assembly

1. Remove bolts securing the upper hinge and lower hinge, then remove the door assmbly.
2. After replacing the door, check the operation of the primary interlock switch, the secondary interlock switch and the interlock monitor switch.
3. Microwave emission should not exceed 5§ /§† (All service adjustments should be made for minimum RF emission.)



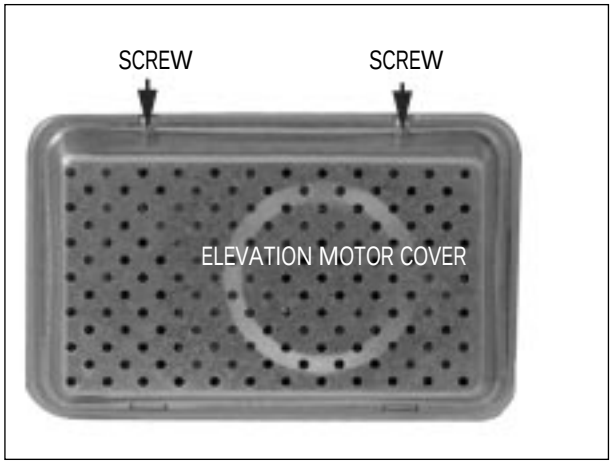
## 4-5 Replacement of Lamp

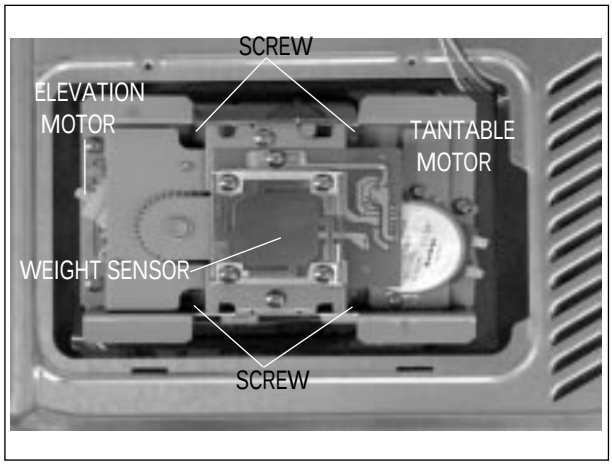
1. Disconnect harness-"A" assembly.
2. Remove screw securing the lamp cover




## 4-6 Replacement of Elevation Motor

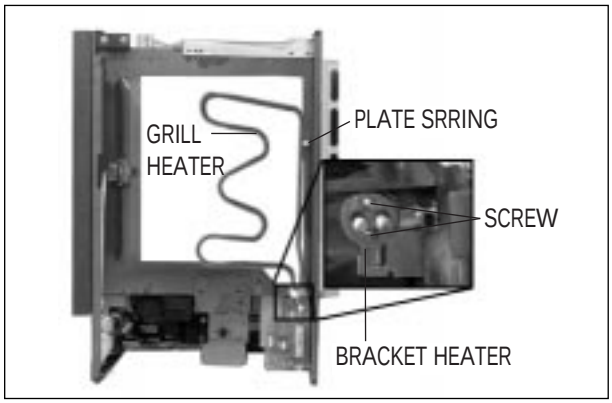
1. Remove the glass tray and assembly from cavity.
2. Turn the oven upside down.
3. Remove screws securing the elevation motor cover.
4. Disconnect all lead wires from the elevation motor.
5. Remove screws securing the elevation motor to the cavity.
6. Remove the elevation motor.
7. When replacing the elevation motor, be sure to remount it in the correct position.
8. Reconnect all the leads to the elevation motor.
9. Screw the elevation motor cover to the base plate with screw driver.
10. Remount the coupler in the correct position.



## 4-7 Replacement of Grill Heater

1. Remove the outer panel.
2. Disconnect all the connectors and terminals on the heater and noise filter assembly.
3. Unscrew nuts securing the grill heater.



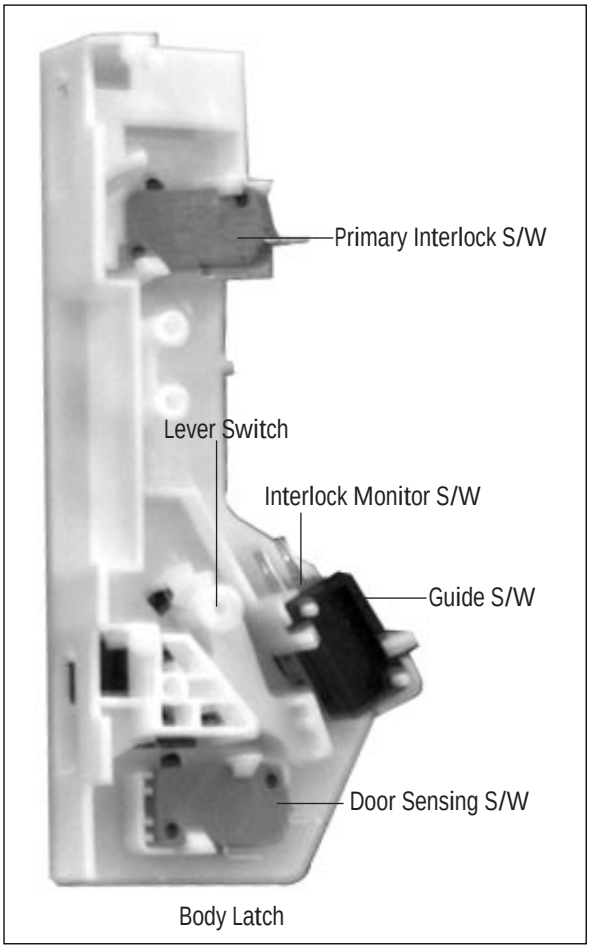

## 4-8 Replacement of Interlock Monitor Switch and Door Sensing Switch

1. Disconnect all lead wires from the interlock monitor switch and the door sensing switch.
2. Push up the mounting tabs.
3. Make necessary adjustments Do the microwave emission check according to "ALIGNMENT AND ADJUSTMENTS" on page 5-2(whenever they any repaired or replaced).

## 4-9 Replacement of Primay Interlock Switch

1. Disconnect all lead wires from the primary interlock switch.
2. Push up the mounting tabs which support the primary interlock switch.
3. Make necessary adjustments and microwave emision check according to "ALIGNMENT AND ADJUSTMENTS" on page 5-2(whenever they are repaired or replaced).

**Interlock Switch Replacement**
When replacing defective switches, be sure to check that the mointing tabs are not bent or broken.

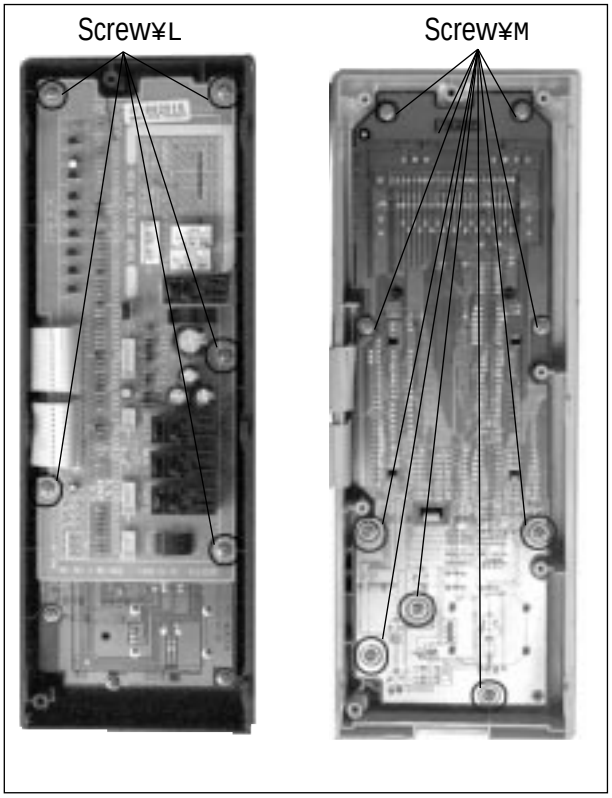


## 4-10 Replacement of Fuse

1. Disconnect the oven from the power source.
2. Remove the 10A fuse from the fuse holder.
3. When replacing the 10A fuse, use an exact replacement and check the primary interlock , door sensing and interlock monitor switches.
4. When the above switches operate properly, check that the control circuit transformer is not defective.

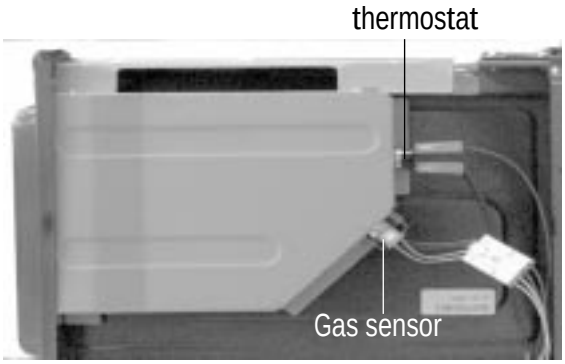
## 4-11 Replacement of Control Circuit Board

1. Be sure to disclyarge any static electricity from your body, and avoid touching the "Touch control" clrcuitry.
2. Disconnect the connectors from the control circuit board.
3. Remove screws ¥L and ¥Msecuring the control circuit bord.
4. Lift up the control circuit board from right side and remove the hooks holding the contol circuit board to the box assembly.




## 4-12 Replacement of Gas Sensor and ThermoSwitch

1. Disconnect all lead wires from the gas sensor and the thermostat.
2. Remove screws securing the air guide.



# 5. Alignment and Adjustments

**PRECAUTION**

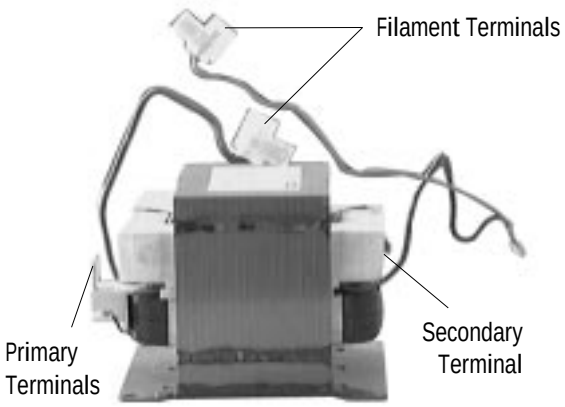
1. High voltage is present at the high voltage terminals during any cook cycle.
2. Do not attempt to measurement the high voltage.
3. Before touching any oven components or wiring, always unplug the oven and discharge the high voltage capacitor.

## 5-1 High Voltage Transformer

1. Remove connectors from the transformer terminals and check continuity.
2. Normal resistance readings are as follows:

| MODEL | CE979GSE |
|---|---|
| Secondary | Approx. 96Ω |
| Filament | Approx.0Ω |
| Primary | Approx.1.6Ω |

(Room temperature = 20˚C)



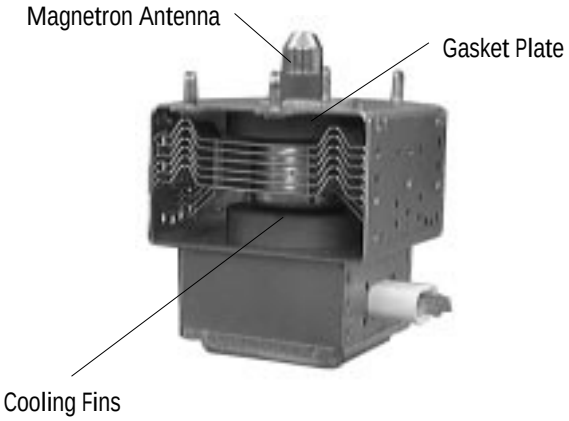

## 5-2 Low Voltage Transformer

1. The low voltage transformer is located on the control circuit board.
2. Remove the low voltage transformer from the PCB Ass'y and check continuity.
3. Normal resistor readings a shown in the table.

| Terminals | Resistance |
|---|---|
| 1~3(Input) | 75.9Ω |
| 4~5(Output 15.5V) | 1.1Ω |
| 5~6(Output 7.3V) | 0.5Ω |
| 7~8(Output 3.2V) | 0.7Ω |
| 8~9(Output 2.7V) | 0.5Ω |

## 5-3 Magnetron

1. Continuity checks indicate only an open filament or a shorted magnetron. To diagnose an open filament or shorted magnetron, do the following:
2. Isolate the magnetron from the circuit by disconnecting its leads.
3. A continuity check across the magnetron filament terminals should indicate one ohm or less.
4. A continuity check between each filament terminal and the magnetron case should read open.



## 5-4 High Voltage Capacitor

1. Check continuity of the capacitor with the meter set at the highest resistance scale.
2. Once the capacitor is charged, a normal capacitor shows continuity for a short time, and then indicates 9MΩ.
3. Shorted capacitor indication: continuity.
4. Open capacitor noication constant 9MΩ.
5. Resistance between each terminal and chassis should read infinite.

## 5-5 High Voltage Diode

1. Isolate the diode from the circuit by disconnecting its leads.
2. With the ohm-meter set at the highest resistance scale, measure across the diode terminals. Reverse the meter leads and read the resistance.

   A meter with 6V, 9V or higher voltage batteries should be used to check the front-to back resistance of the diode. (Otherwise an infinite resistance may be read in both directions.) The resistance of a normal diode will be infinite in one direction and several hundred KΩ in the reverse direction.

## 5-6 Main Relay and Power Control Relay

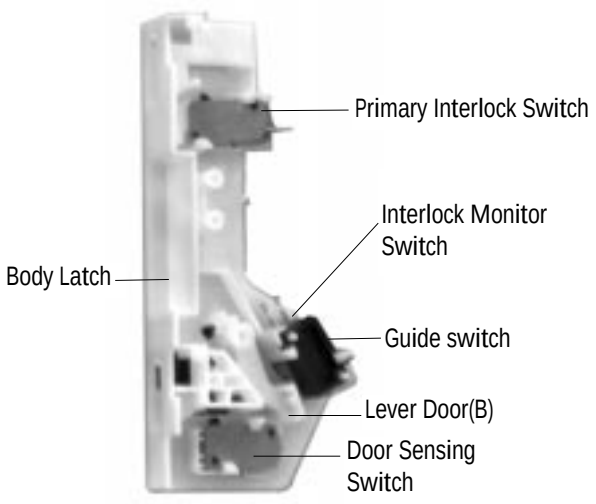
1. The relays are located on the PCB Ass'y. Isolate them from the main circuit by disconnecting the leads.
2. Operate the microwave oven with a water load. Set the power level to "high"
3. Check continuity between terminals of the relays after the start pad is pressed.

## 5-7 Adjustment of Primary Switch, Door Sensing Switch and Monitor Switch

**Precaution**

For continued protection against radiation hazard, replace parts in accordance with the wiring diagram and be sure to use the correct part number for the following switches: Primary and secondary interlock switches, and the interlock monitor switch (replace all together). Then follow the adjustment procedures below. After repair and adjustment, be sure to check the continuity of all interlock switches and the interlock monitor switch.

1. When mounting primary switch and interlock monitor switch to latch body, consult the figure.
2. No specific adjustment is necessary during installation of primary switch and monitor switch to the latch body is necessary.
3. When mounting the Latch Body to the oven assembly, adjust the Latch Body by moving it so that the oven door has vo "play". Check for play by pulling the door assembly. Make sure that the latch keys move smoothly after adjustment is completed. Completely tighten the screws holding the latch body to the oven assembly.
4. Reconnect to Monitor switch and re-check that the the monitor circuit and all latch switches are secured.(see components test procedures).
5. Confirm that the gap between the switch housing and the switch actuator is no more than 0.5mm when door is closed.




| | Door Open | Door Closed |
|---|---|---|
| Primary switch | ∞ | 0 |
| Monitor switch (COM-NC) | 0 | ∞ |
| Monitor switch (COM-NO) | ∞ | 0 |
| Door Sensing S/W | ∞ | 0 |

## 5-8 Output Power of Magnetron

**CAUTION**
**MICROWAVE RADIATION**

DO NOT ALLOW EXPOSURE TO MICROWAVE RADIATION FROM ANY PARTS CONDUCTING MICROWAVE ENERGY.

The output power of the magnetron can be measured by performing a water temperature rise test.
Equipment needed :
* One 1-liter cylindrical borosilicate glass vessel (Outside diameter 190 mm)
* One glass thermometer with mercury column
NOTE: Check line voltage under load. Low voltage will lower the magnetron output. Brenk the line here make all temperature and time tests with accurate equipment.

1. Fill the one liter glass vessel with water.
2. Stir water in glass vessel with thermometer, and record glass vessel's temperature ("T1", 10±1˚C).
3. After moving the water into another glass vessel, place it in the center of the cooking tray. Set the oven to high power and operate for 51 seconds exactly. (3 seconds included as a holding time of magnetron oscillation.)
4. When heating is finished, stir the water again with the thermometer and measure the temperature ("T2").
5. Subtract T1 from T2. This will give you the water temperature rise. (ΔT)
6. The output power is obtained as follows :

$$\text{Output Power} = \frac{4.187 \times 1000 \times \Delta T}{49}$$

49 : Heating Time (sec)
4.187 : Coefficient for Water
1000 : Water (cc)
ΔT : Temperature Rise (T2-T1)

* Output (W) = 85.5x ΔT

7. Normal temperature rise for this model is 9˚C to 11˚C at 'HIGH'.
   NOTE 1: Variations or errors in the test procedure will cause a variance in the temperature rise. Additional power test should be done if temperature rise is marginal.
   NOTE 2: Output power in watts is computed by multiplying the temperature rise (step E) by a factor of 91 times the centigrade temperature.

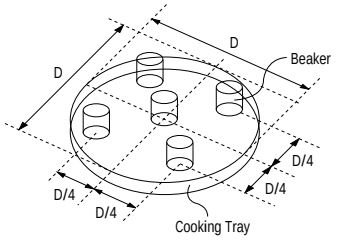
## 5-9 Uniformity of Microwave Heat Distribution

The microwave heat distribution can be checked indirectly by measuring the water temperature rise at certain positions in the oven:

1. Prepare five beakers made of 'Pyrex', each having 100 milliliters capacity.
2. Measure exactly 100milliliters off water load with a measuring cylinder, and pour into each beaker.
3. Measure the temperature of each water load. (Readings shall be taken to the first decimal.)
4. Put each beaker in place on the cooking tray as illustrated in the figure. Start heating.
5. After heating for 2 minutes, measure the water temperature in each beaker.
6. Microwave heat distribution rate can be calculated as follows:

$$\text{Heat Distribution} = \frac{\text{Minimum Temperature Rise}}{\text{Maximum Temperature Rise}} \times 100(\%)$$

The result should exceed 65%.



# 5-9 Leakage Measuring Procedure

## 5-9-1 Equipment

1. Microwave Energy Survey Meter
2. Glass beaker, 600cc
3 Mercurial or digital thermometer 100˚C or 212˚F

## 5-9-2 Procedure for Measurement of Microwave Leakage

1. Pour 275±15cc of 20±5˚C (68±9˚F) in toA 600cc graduated beaker. Place the beaker in the center of the oven.

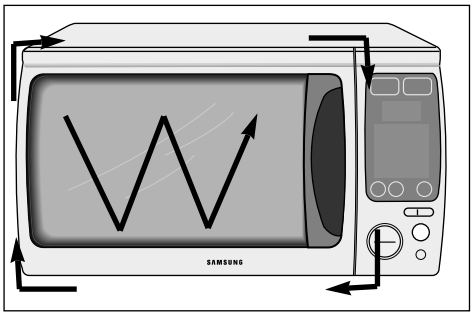
2. Start the oven and measure the leakage using a microwave energy survey meter.

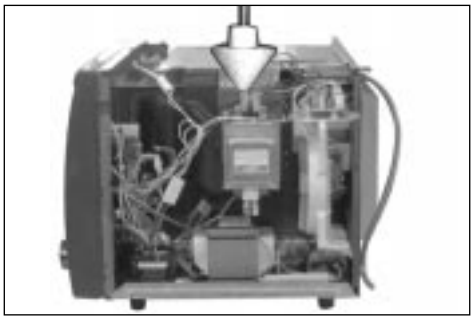
3. Set survey meter ( dual ranges) to 2,450MHz.

4. When measuring the leakage, always use the 2 inch spacer cone with the probe. Hold the probe perpendicular to the cabinet door. Place the spacer cone on the door seam and move the probe along the viewing windows and exhaust openings. Move the probe at about 1 inch per second.

   If the leakage from door seam is measured near a corner, keep the probe perpendicular, making sure the probe end(at the base of the cone) does not gt closer than 2 inches to any metal (otherwise, erroneous readings readings will result).

5. The measured leakage must be less than 5mW/cm$^2$.



**WARNING**
**AVOID TOUC HING THE HIGH VOLTAGE COMPONENTS.**

## 5-9 Leakage Measuring Procedure

### 5-9-3 Check for Microwave Leakage ( With the opter panel removed)

1. Remove the outer panel.
2. Pour 275±15cc of 20±5˚C(68±9˚F) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.
3. Start the oven at the highest power level.
4. Set survey meter dual ranges to 2,450MHz.
5. Using the survey meter and spacer cone as described above, measure arnear the opening of magnetron, the surface of the air guide and the surface of the wave guide as shown in the following photo.( but avoid the high voltage components.) The neading should be less than 5mW/cm$^2$.

### 5-9-4 Measurement Notes

1. Do not exceed the limited scale.
2. The test probe must be held on the grip of the handle, otherwise a false reading may result when the operator's hand is between the handle and the probe.
3. When high leakage is suspected, do not move the probe horizontally along the oven surface; this may cause damage to the probe.
4. Follow the recommendation of the manufacturer of the microwave energy survey meter.

### 5-9-5 Record Keeping and Special Notification

1. After adjustment and repair of a radiation protection device, record for the measured values, and keep the data.
2. If the radiation leakage exceeds 5mW/cm$^2$ (after determining that all parts are in good condition, functioning properly and that central service center identical parts are replaced as listed in this manual) notify the central repair facility.
3. At least once a year have the Microwave Energy Survey Meter checked for accuracy by its manufacturer.

# 6. Circuit Description

## 6-1 When food is placed inside oven and door is closed

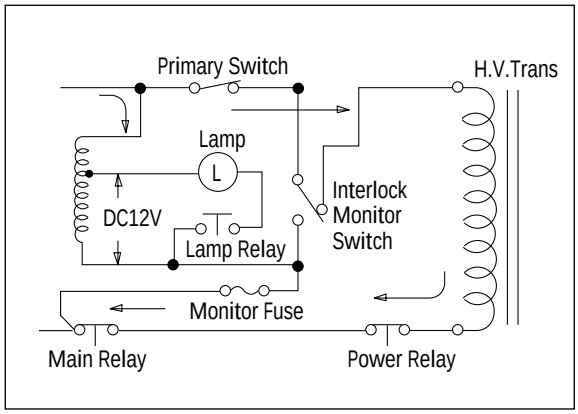
1. Low voltage transformer supplies the necessary voltage to the touch control circuit when power cord is plugged in.
2. The primary interlock switch is closed.
3. The interlock monitor switch is opened. This interlock monitor switch blows the 10A fuse and stops magnetron oscillation when the door is opened (abnormal condition).
4. The door key is caught by the door hook, this clodesthe door sensing switch is closed to send the door-close signal to the touch control circuit.

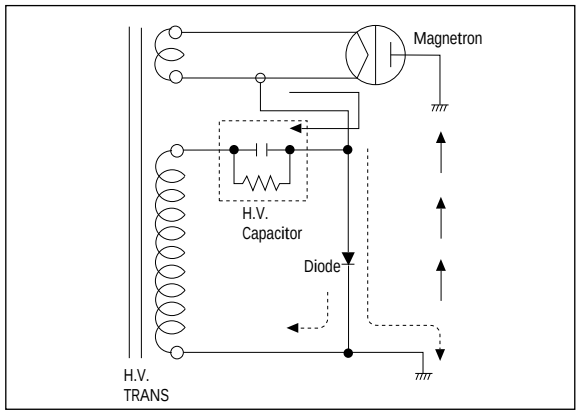
## 6-2 When cooking, power and time are set by touching the function pads

1. The time appears in the display window.
2. The touch control circuit stores the cooking data at.

## 6-3 When the START pad is touched

1. The main relay and the power control relay are controlled by the touch control circuit.
2. An oven lamp lights the inside of the oven by (The lamp relay in the Touch Control Circuit).
3. The fan motor rotates and cools the magnetron by blowing the air from the intake (on the back panel) over the magnetron fins. After cooling the fins, this air is directed into the oven to blow out the vapor.

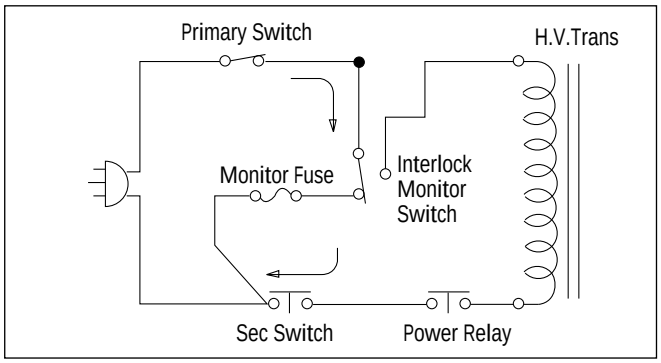



4. 230V~50Hz AC is applied to the high voltage transformer through the contacts of primary windings ( shown by the solid line) just after the power control relay turns ON. (Fig. 1)
5. 3.4V AC is generated from the filament winding of the high voltage transformer. This 3.4V is applied to the magnetron to heat the magnetron filament through two noise preventing choke coils.
6. High voltage (2,230 volts AC) is generated by the high voltage transformer secondary. This secondary voltage is increased by the diode and high voltage capacitor. This resultant DC voltage is then applied to the anode of the magnetron. As shown in Fig. 2, the first half cycle of the high voltage produced in the secondary high voltage transformer charges the high voltage capacitor.The dotted lines indicate the current flow. During operation of the second half cycle, the voltage produced by the transformer secondary (plus the charge of the high voltage capacitor) is applied to the magnetron as shown in the solid line, which cawses the magnetron to oscillate. The electrlcal interference generated by the magnetron is prevented by the 1.6uH choke coils, 500pF filter capacitors and the magnetrons shielded case (so that TV and radio signals are immune).
7. The power control relay is turned on intermittently by the touch control circuit (when the oven is set at any power) except full power. The touch control circuit controls the ON/OFF time of the power control relay in order to vary the output power of the microwave oven from Low to "Full" power. One complete ON/OFF cycle of the power control is 30 seconds.
8. The cooking when the oven is set at any power setting is shown on the display (starts to count down.)

## 6-4 When the door is opened during cooking

1. The primary interlock switch is opened to cut off the primary voltage of the high voltage transformer. Thes stops microwave oscillation.
2. The door sensing switch is opened which signals the touch control circuit. The main relay stays on, the power control relay turns off and the display stops counting down.
3. The fan motor and turn-table motor are stopped by operation of the primary interlock switch. The oven lamp lights the inside of the oven again until the door is closed.
4. Upon opening the door, the contacts of the primary interlock switch open and the contacts of interlock monitor switch close.
5. If the contacts of primary interlock switch do not function properly, the monitor fuse blows out because of the large current surge (caused by the monitor switch activation, which stops magnetron oscillation). see Fig. 3



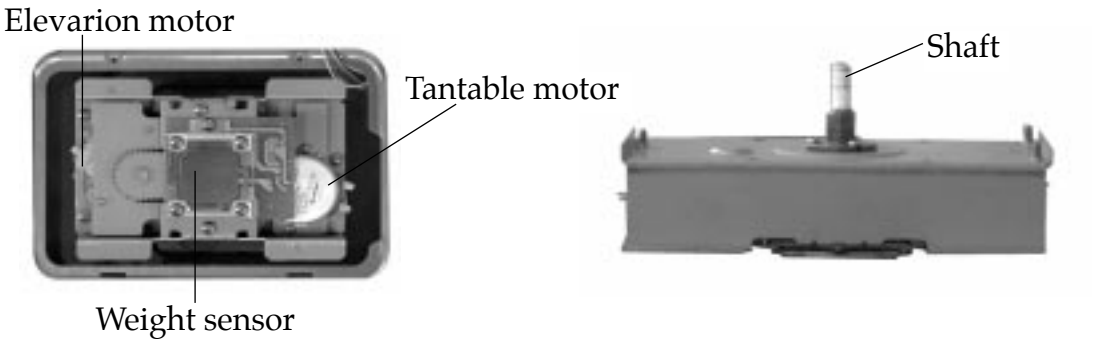

## 6-5 When the CANCEL pad is touched during cooking

1. Touching the CANCEL pad once stops cooking. Touching on the pad twice cancels all programs stored in the touch control circuit. The time of day reappears on the display window.
2. The oven lamp and cooking indicators turn off.
3. The fan motor stops.
4. The power control relay turns off to cutting the primary voltage to the high voltage transformer (This stops magnetron oscillation).

# 7. Troubleshooting

## 7-1 Checking the Weight Sensor

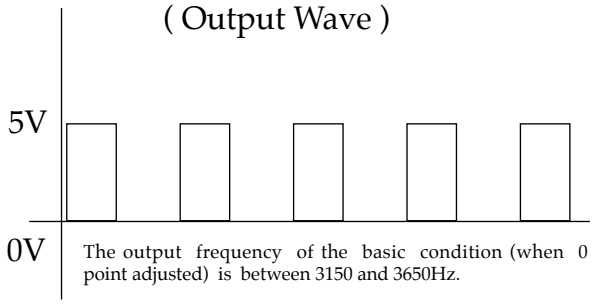
### 7-1-1. Overview




### 7-1-2. Operation

1. If the weight of the food is less than 1.5Kg (including the cooker), the rotating dish automatically moves to the optimum location by the elevation motor.
   (If the weight is more than 1.5Kg the cooking is done in the basic location)
2. When defrosting, the weight sensor detects the weight and moves the food to the appropriate height . (The elevation operates when the weight is less thon1.0Kg or less (including the dish)).
3. When reheating food 700g or less (including the dish), it swings once and then cookis in the basic location. (If the weight is 700g the cooking is done in the basic location)
4. Manual cooking is done in the basic location with only the rotating motor operating.
   (Maximum of 4Kg including the dish if the weight exceeds 4kg, an "E5" error occurs.)

### 7-1-3. Operating Principle of the Height Sensor



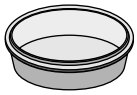

The weight sensor converts the weight of the food into a series of pulses that are compared to the"zero point" wavefrom. This frequency difference determines the cooking time.

### 7-1-4. Zero point and Inclination Adjustment

1. Turn the power on again and set time initial condition to "8888".
2. Put a dish inside the cooking space.
3. Press the sensor defrost( ) and power level/more,less( ) keys simultaneously until "0000"is displayed (about 5 seconds).At this time lamp and the rotating dish motor are on.
4. After 10 seconds, A normal neading is between 3150 and 3650.
5. Put the 1Kg standard weight at the center of the glass tray and close the door.
   (When setting the 1Kg weight, put the metal rack, roasting spit, glass bowl and two skewers on the glass tray. Then do the zero point adjustement.)

(Metal Rack)

(roasting spitspit)

(two skewers)

(glass bowl)

6. Press the sensor reheat( ) and power level/more,less( ) keys simultaneovsly until the "1111"is displayed. (about 5 seconds). At this time lamp and the rotating dish motor are on.
7. After 10 seconds, A normal reading is between 0350 and 0650.
8. Press the cancel key to complete the adjustment.

### 7-1-5. Error codes

| Error indication | Cause of occurrence | Management method | Remarks |
|---|---|---|---|
| E0 | Gas sensor open/short (sensor value between 6 and 211) | Check the connection and cooking reheating Put the power switch again and and use it after 10 minutes. | Automatic reheating |
| E1 | Exceeds of T1 time limit (gas sensor) | First press the cancel key and check if the food is positiotes | Automatic reheating |
| E4 | Problem with the weight sensor (Output frequency=0Hz) | Exchange the weight sensor Check the wire connection | |
| E5 | Excess of maximum weight (The total weight exceeded 4Kg) | Cook within 4Kg | |
| E6 | Excess of maximum allowed time with maximum load (When cooking food that weight less tman 300g the maximum time is 10 minutes.) | When cooking 300g or less, cook within 10minutes. | |
| E8 | No tray (Occurs if oven is operated without the rotating dish.) | Install the rotating dish | |
| E10 | Problen with the EEPROM | Replace the PCB assy | |

### 7-1-6. Hidden key

1. Check the gas sensor : Press the sensor defrost and sensor reheat keys simultaneovsly.
   (Display : Between 5 and 210).
2. Child lock function : Press the cancel key for 3 seconds
   (the function is executed after the buzzer sounds). To ondo the child lock,
   press the cancel key for 3 seconds.
3. Cooking completion remind function : If the food is not removed after cooking,
   the buzzer sounds every minute.

### 7-1-7. Precautions

1. Do not apply heavy load or pressure on the rotating dish
   (The elevation and the weight sensor directly contact the rotating dish).
   Putting food that exceeds 4kg(Total) can damage the weight sensor.
2. Use only genuine replacements that fit the model(C.E., rotating dish and supporter).
3. When food exceeding 300g(Total) is put on the rotating dish, the oven operates for only 10 minutes.
   (Error E6 occwrs.)

### 7-1-8. Reppacing Parts

1. Discharge the capacitor for about 5 to 6 minutes after cutting the power, and then continue the work.
2. Do not damage the coating on the wires.
3. When removing the wire the terminal, hold the positive lock case with the finger and assemble it. Otherwise use a tool (such as long nose pliers)
4. If you remove the tie during servicing, do not damage the wire. Adjust and arrange the wire and tie(heat proof onsulated tie) after the repairs have been completed.

**PRECAUTION**

1. FIRST CHECK THE GROUND CONNECTIONS.
2. BE CAREFUL OF THE HIGH VOLTAGE CIRCUIT.
3. DISCHARGE THE HIGH VOLTAGE CAPACITOR.
4. WHEN CHECKING THE CONTINUITY OF THE SWITCHES OR TRANSFORMER, DISCONNECT ONE LEAD WIRE FROM THESE PARTS AND THEN CHECK CONTINUITY WITHOUT THE POWER SOURCE ON. OTHERWISE YOU MIGHT DAMAGE THE METER ORGET APTISE READING.
5. DO NOT TOUCH ANY PART OF THE CIRCUIT OR THE CONTROL CIRCUIT BOARD, SINCE STATIC DISCHARGE MAY DAMAGE IT. ALWAYS TOUCH GROUND WHILE WORKING ON IT TO DISCHARGE ANY STATIC CHARGE BUILT UP.

## 7-2 Simple Troubleshooting Chart

| Item | Checking Procedwre |
|---|---|
| Inspection of microwave oven cooking | a. Put about 200cc of tap water (water temperature 10-18°) on the rotating dish.<br>b. Do the following :.<br>Microwave oven high ¡ time setting 5 minute ¡ start cooking<br>c. The water temperature should be about 80° |
| Inspection of grill cooking | a. Put the applicable " cooker" for grill cooking inside<br>b. Do the following grill ¡ time setting<br>5 minutes ¡ start cooking.<br>c. Normal : The seize heater is red. |

## 7-3 Problem Analysis

### 7-3-1 When inserting the power plug (function selection, door on/off)

| Problem | location | Cause | Measures |
|---|---|---|---|
| No alphivumeric display | a. Fuse (250V, 10A)<br>b. Magnetron and case, temperature switch<br>c. Power plug and socket<br>d. 1st and 2nd of LVT<br>e. Connector of PCB board<br>f. Highlight indication plate<br>g. Circuit within the PCB board | Open bad contacts<br><br><br>Bad contacts<br>Cut-off<br>Bad insertion<br>Poor<br>Board DC fect on | Exchange<br>Exchange<br><br><br>Exchange,repair<br>Exchange<br>Repair<br>Exchange<br>PC Board exchange |
| Fuse is damaged (short circuit) | a. Power transformer<br>b. Safety switch<br>c. Monitor switch (short switch)<br>d. HVC<br>e. Latch operation | Short circuit<br>Fusion and poor<br>Poor operation<br>Short circuit<br>Poor operation | Exchange<br>Exchange<br>Latch adjustment<br>Exchange<br>Latch adjustment |

### 7-3-2 When operating

| Problem | location | Cause | Measures |
|---|---|---|---|
| Electrical shock | a. Grounding wire<br>b. AC 230V power line is the chassis | Bad grounding<br>Lead wire not connected<br>Exposed part of the power line is shorting the chassis | Inspection<br><br>Adjustment |
| Lamp is not on | a. Lamp and lead wire<br>b. Check the lamp relay<br>c. Thermostat 2EA<br>d. LVTransformer | Disconnected<br>Coil disconnected<br>Bad contact point<br>Is the LVT wire normal? | Exchange/adjustment<br>Exchange<br>Exchange<br>Exchange/adjustment |
| Elevation action unsatisfactor | a.Check the connections to the elevation assembly<br>b. Continuity between terminals of the elevation motor (Measure after removing the power leads) | Poor wire connection<br><br>Disconnection | Adjustment<br><br>Exchange/ Assembly exchange |

## 7-3-2 When operating (Continued)

| Problem | Inspecting location | Cause | Measures |
|---|---|---|---|
| Fuse blows out | a. Resistance between high voltage condenser terminals (Measure it after cutting the power and pulling the terminal)<br>b. High voltage transformer (See precautions)<br>c. High voltage transformer (Cut the power) | The nesistmce should be about 10§<br>Fuse is blown if secondary winding is open<br>Resistance neadings should be:<br>A=about 96§<br>B=about 0.1§<br>C=about 1.6§<br>D= ¡ ~ but ween c | . Exchange |
| Sparks occvr durins cooking | a. Quality of the "cooker" being used<br>b. Left-over food<br>c. Piacement of the bupporter | Misuse of metallic material<br>Carbonization of food left over<br>Poor placement of rotating shaft | Explanation<br>Explanation / and cleaning<br>Explanation/ and adjustment |
| Microwdve leakage puring operation | a. Condition of the door Assembly<br>b. The surface contacting the front of the cooking room and the door | Not enough contact in the front side of the cooking room and the door<br>Deformation | Adjust the door hinge .<br>Check the operating condition of the safety switch.<br>Adjustment or exchange |
| Food does not heat | a. Continuity between magnetron terminals<br>b. High voltage transformer 1st coil continuity (Measure it after cutting the power lead).<br>c. Continuity of high voltage diode (Measure it after cutting the power leads).<br>d. Continuity between the magnetron<br>e. High frequency emissions<br>f. Power relay operation | Disconnection<br>Disconnection<br>Forward direction =about 0§<br>Reverse direction =500§<br>Bad continuity<br>Bad magnetron<br>Bad contact points | Exchange |

### 7-3-2 When operating (Continued)

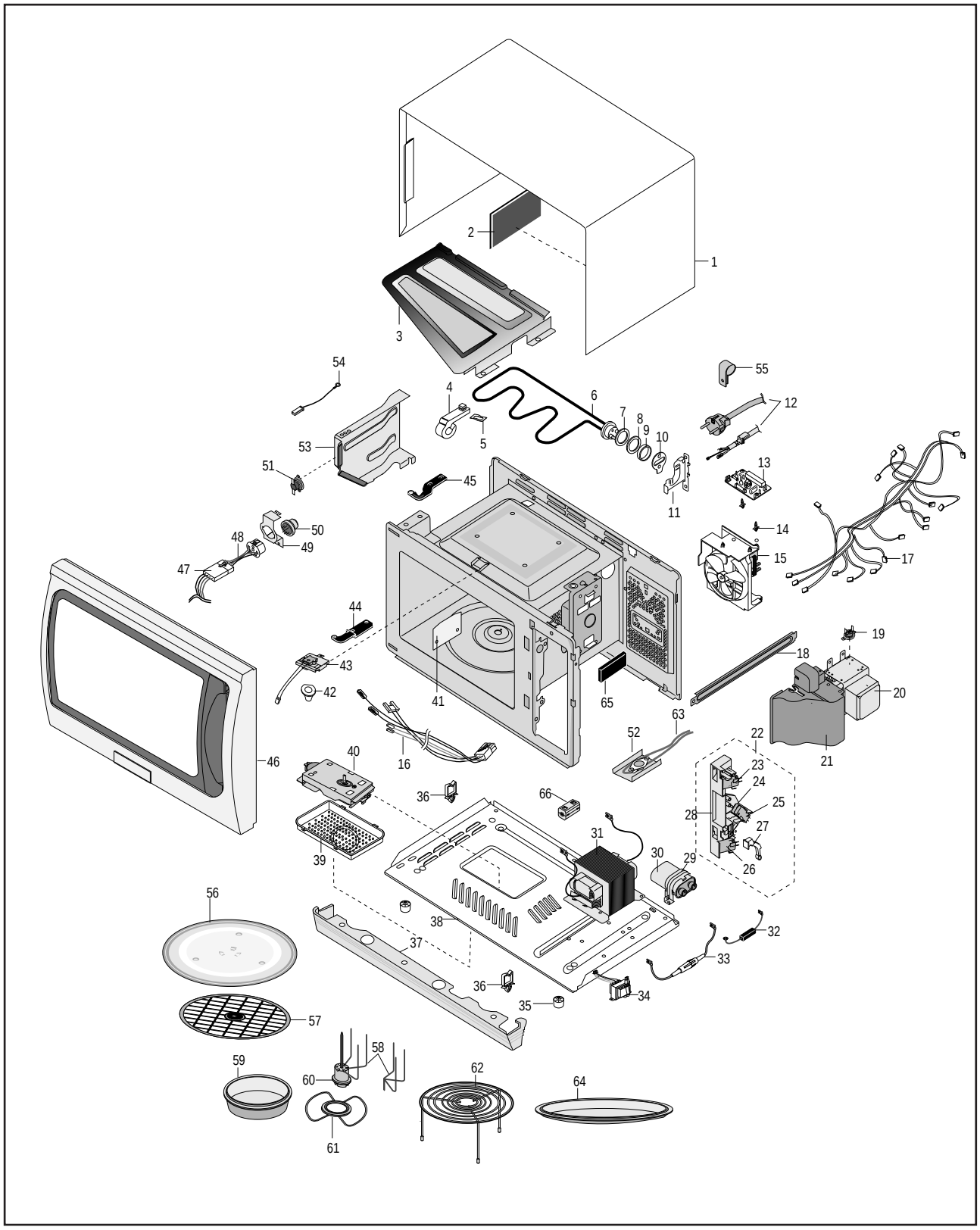
| Problem | Inspecting location | Cause | Measures |
|---|---|---|---|
| Turntable motor doesn't rotate | a. Continuity between terminals (Measure after removing the power leads)<br>b. Lead (terminal)<br>c. Alien substance in the motor | Disconnection<br><br>Needs cleaning | Exchange<br>Adjustment<br><br>Adjustment |
| Fan motor doesn't rotate | a. Continuity between terminals (Measure after disconnecting the power and lead wire)<br>b. Lead (terminal)<br>c. Rotate the fan by hand | Disconnection<br>Poor insertion and disconnection<br>Bad contacts needs cleaning | Exchange<br>Adjustment<br><br>Adjustment or exchange |
| Poor defrosting | a. Check the connections to the weight sensor<br>b. Readjust the 0 point | Poor connection<br><br>0 point not adjusted | Adjustment<br><br>Taking measures according to the error list. |

## 7-4 After-Repair Check Listd

| No | Check item | Checking and judging method | Remarks |
|---|---|---|---|
| 1 | Insulation resistance | When measuring the insulation resistance between the power plug and the grounding wire(with the power plug disconnected from the socket and the door closed) the resistance should be greater than 1§ or above. When to check :<br>a. When the electric field parts are exchanged<br>b. If the MWO is used in a very humid envir qwment<br>c. Unit is older than 5 years | DC 500V Megatester |
| 2 | Safety switch operation | Check that the safety switch is operating correctly when opening and closing the door | Safety switch<br>Monitor switch<br>Door detection switch |
| 3 | Applicability of parts | Check that exact replacement parts are being used | AC 230V |
| 4 | Placement of lead wire | Check for looseness, jamming or terminal insertion of the lead wire. (check that there are no shorts to ground. | |
| 5 | Connection of screw and bolt | Check the connection between he screw and bolt. | |
| 6 | Alien substance insertion check | Check for a cut line within the equipment, combustible foreign matter, or loose hardware. | |
| 7 | Power cord check | Check that there is no damage to the cord, plug, socket etc.<br>Also check that power rating is adequate. | |
| 8 | Grounding check | Check that the main body is grounded to the PCB.<br><br>Explain to the customer that he following are dancerous hazards :<br><br>a. Connection to the gas pipe<br>b. Connection to the vinyl water pipe<br>c. Connection to the telephone line. | For the PCB ground wire and power cord ground wire,<br>Check the continuity to ground. |

# 8. Exploded Views and Parts List

## 8-1 Exploded Views



## 8-2 Main Parts List

| Ref. No. | Parts No. | Description/Specification | Q'ty | Remarks |
|---|---|---|---|---|
| 1 | DE70-30030N | PANEL-OUTER;PURE WHT POWER-KOAT | 1 | |
| 2 | DE63-90035G | CUSHION-RUBBER;DFA20 T2 W190 L100 BLK | 1 | ● |
| 3 | DE61-50074B | BRACKET-UPPER;SECC T0.6 W248 L422 M9G45 | 1 | |
| 4 | DE61-30006A | SUPPORTER-HEATER;ALUMINA 5G 2ND-W/P0 | 1 | |
| 5 | DE61-70060A | SPRING-PLATE;SK-5 T0.5 | 1 | |
| 6 | DE47-70031G | HEATER-GRILL;D6.6 230V1280W M9G45 SJH | 1 | ● |
| 7 | DE60-40009B | WASHER-TEFLON;SLOT ID22.2 OD28 T1.2 TEFL | 1 | |
| 8 | DE63-20017A | GASKET-HEATER;BRASS T1.5 OD30.5 ID22.5 | 1 | |
| 9 | DE60-90006A | FLANGE-RING;C3604BD ID22.1 OD26 L4.7 MBG | 1 | |
| 10 | DE61-50347A | BRACKET-EARTH;BSS2-A T1.0 W35 L43 MBGF45 | 1 | |
| 11 | DE61-50027B | BRACKET-HEATER;SECC T1.0 W51 L55 CE945GF | 1 | ● |
| 12 | DE39-20058D | ASSY POWER CORD;KKP-4819D/B232 230V/16A L1700 | 1 | ● |
| 13 | DE91-40042A | ASSY NOISE FILTER;DNA-1019(C) 250V 10A C | 1 | |
| 14 | DE61-30129A | SUPPORTER-PCB;DASS-T9N | 2 | |
| 15 | DE31-10077D | MOTOR-FAN;AMM92-002AUEC 230V50HZ MIN2550 | 1 | |
| 16 | DE39-40005B | ASSY WIRE HARNESS-D;220V60HZ RE-642/652 | 1 | ● |
| 17 | DE39-40515A | ASSY WIRE HARNESS-A;220V/50HZ,E9G88S ELE | 1 | ● |
| 18 | DE61-30054A | SUPPORTER-MGT;SECC T0.6 W33.2 L317 MW563 | 1 | |
| 19 | DE47-20052A | THERMOSTAT;PW-2N 160/60 TERMINAL-Z BK T2 | 1 | |
| 20 | DE03-30035A | MAGNETRON;OM75PH((31)ESS | 1 | ⚠ |
| 21 | DE92-90421A | ASSY-COVER AIR;RE-642 | 1 | ● |
| 22 | DE93-20020A | ASSY BODY LATCH;RE-43B/90B | 1 | |
| 23 | 3405-000178 | SWITCH-MICRO;250V,15A,200gf,SPST-NO | 1 | |
| 24 | DE72-60106A | GUIDE-S/W;ABS BLK | 1 | |
| 25 | 3405-000175 | SWITCH-MICRO;250V,15A,200gf,SPST-NO | 1 | |
| 26 | 3405-000178 | SWITCH-MICRO;250V,15A,200gf,SPST-NO | 1 | |
| 27 | DE66-90054A | LEVER-SWITCH;POM(F20-02) 15G NTR RE-330 | 1 | |
| 28 | DE66-40021A | LATCH-BODY;POM(F20-02) 50G RE-330 | 1 | |
| 29 | DE61-50106A | BRACKET-HVC;SECC T0.8 W31 L125.8 | 1 | |
| 30 | 2501-001029 | C-OIL;1.05uF,2100V,BK,35x54x90,20mm | 1 | |
| 31 | DE26-10042B | TRANS-H.V;Y9245NTC-1 230V 50HZ AC2230V M | 1 | |
| 32 | DE59-40001A | DIODE-H.V;HVR-1X-32B-12 | 1 | |
| 33 | DE91-70061B | ASSY-H.V.FUSE;THV060T-0750-H 5KV0.75A RE | 1 | |
| 34 | DE26-20142A | TRANS-L.V;RE-751STC 230V 50HZ AC11/15.5/ | 1 | ● |
| 35 | DE61-40029A | FOOT;DASF-330 RE-909CG | 4 | |
| 36 | DE65-20025A | CABLE CLAMP;DAWS-2NB NYLON66 NTR WIRE SA | 2 | |

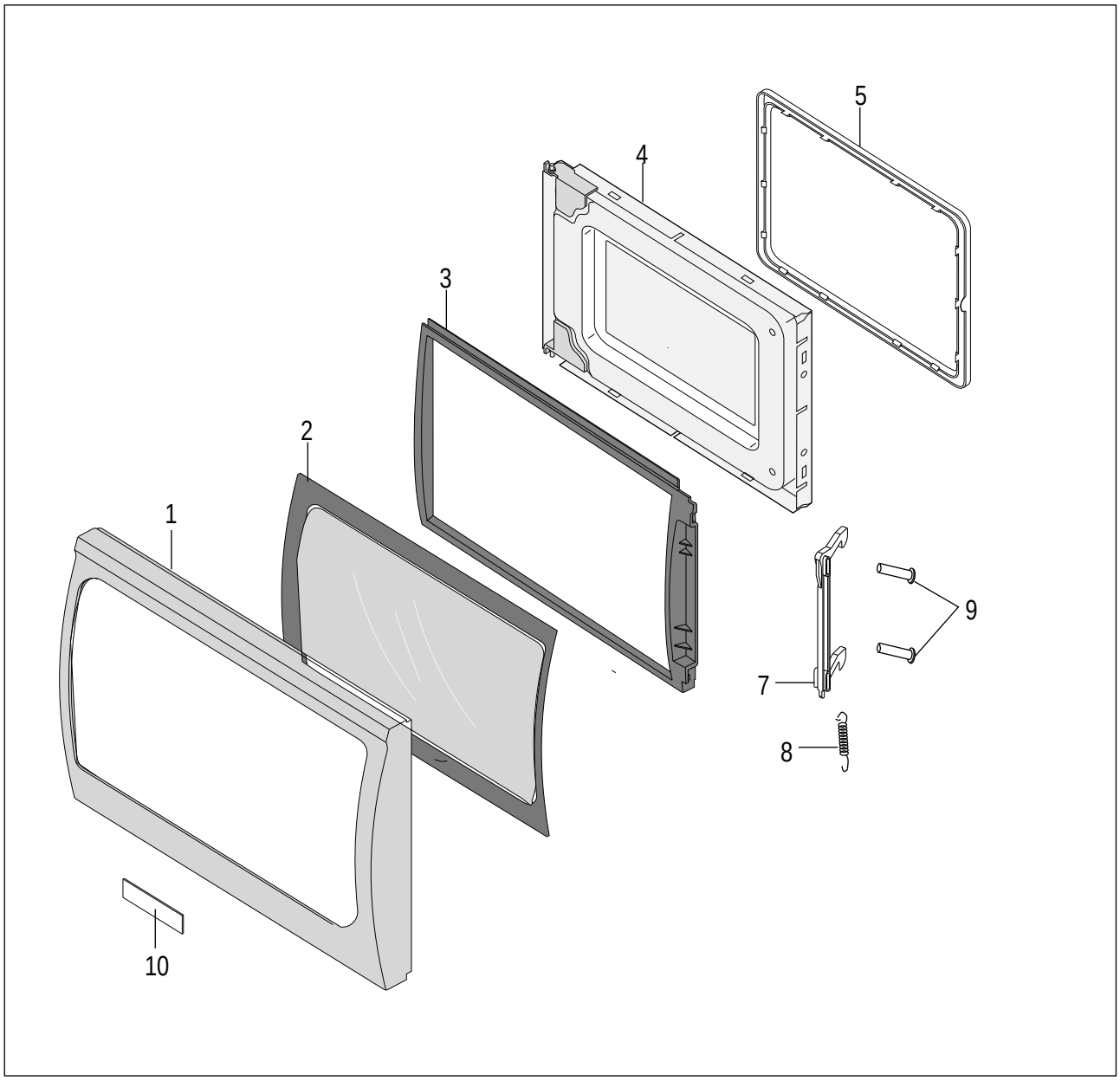
● : Option Parts ⚠ : Warning ⚠ :Electrostatically Sensitive Devices

## 8-2 Main Parts List

| Ref. No. | Parts No. | Description/Specification | Q'ty | Remarks |
|---|---|---|---|---|
| 37 | DE64-90024A | DECORATION-FOOT;ABS P/WHT 25G E9G88S(SSE | 1 | |
| 38 | DE80-10037A | BASE-PLATE;SGCC1-Z T0.8 W336.5 L555 | 1 | |
| 39 | DE61-50081A | BRACKET-COVER MOTOR;SGCC1-Z T0.6 W219.8 | 1 | |
| 40 | DE93-90003A | ASSY-ELEVATION;RE-751/652 | 1 | |
| 41 | DE71-60195A | COVER-CEILING;MICA-SHEET T0.5 W59 L122 W | 1 | |
| 42 | DE67-40064A | GLASS-LAMP;GLASS T3.0 W28 L15 RE-751 | 1 | |
| 43 | DE91-70155A | ASSY-LAMP;RE-652/751 CERAMIC | 1 | |
| 44 | DE61-80006B | HINGE-LOWER;ZP2W T3.0 ZN(PLATING) RE-552 | 1 | |
| 45 | DE61-80037C | HINGE-UPPER;SCP1 T3.0 W26 L76 ZP2C-W MB2 | 1 | |
| 46 | | ASSY DOOR;CE979GSE(SCAW) P/WHT HANDLE AB | 1 | ● ⚠ |
| 47 | DE39-40012A | ASSY WIRE HARNESS-SENSOR;220V/60HZ RE-64 | 1 | |
| 48 | DE39-40396A | WIRE HARNESS-D;110/220V RE-850V DOM | 1 | |
| 49 | DE61-50301A | BRACKET-COVER;SBHG1-A RE-707GMS | 1 | |
| 50 | DE32-60013A | SENSOR-GAS;ST-MWO | 1 | |
| 51 | DE47-20039A | THERMOSTAT;PW-2N 120/110 V-TYPE | 1 | |
| 52 | DE93-90002A | ASSY-BKT TCO;RE-642 | 1 | |
| 53 | DE72-60035H | GUIDE-AIR;SECC (T)0.6 (W)240 (L)242.5 CE | 1 | |
| 54 | DE39-30147A | WIRE LEAD-E;140*120 GRN BLK | 1 | |
| 55 | DE65-20014A | CABLE CLAMP;DA-6N NY-66 | 1 | |
| 56 | DE74-20011A | TRAY-COOKING;GLASS T5.5 PI320 RE-605S | 1 | |
| 57 | DE92-90012A | ASSY-TRAY SUB;RE-642 | 1 | |
| 58 | DE72-80062A | SHAFT-BARBECUE;STS304 D3 L149 W60.25 CE9 | 6 | |
| 59 | DE74-20022A | TRAY-OIL;GLASS(NEOREX) T5 PI210 600G | 1 | |
| 60 | DE92-90433A | ASSY-SHAFT BARBECUE;CE979GSE STS304 D6 | 1 | |
| 61 | DE92-90334A | ASSY-LEG;M9GF45 | 1 | |
| 62 | DE92-90510A | ASSY RACK-WIRE;M97G45 | 1 | |
| 63 | DE39-40011A | ASSY WIRE HARNESS-C;220V/60HZ RE-642 | 1 | |
| 64 | DE74-20107A | TRAY-BROILER;SPP 0.8T 345 345 345 ENAMEL | 1 | |
| 65 | DE63-90070A | CUSHION-DIGITRON;T4 W55 L30 | 1 | |

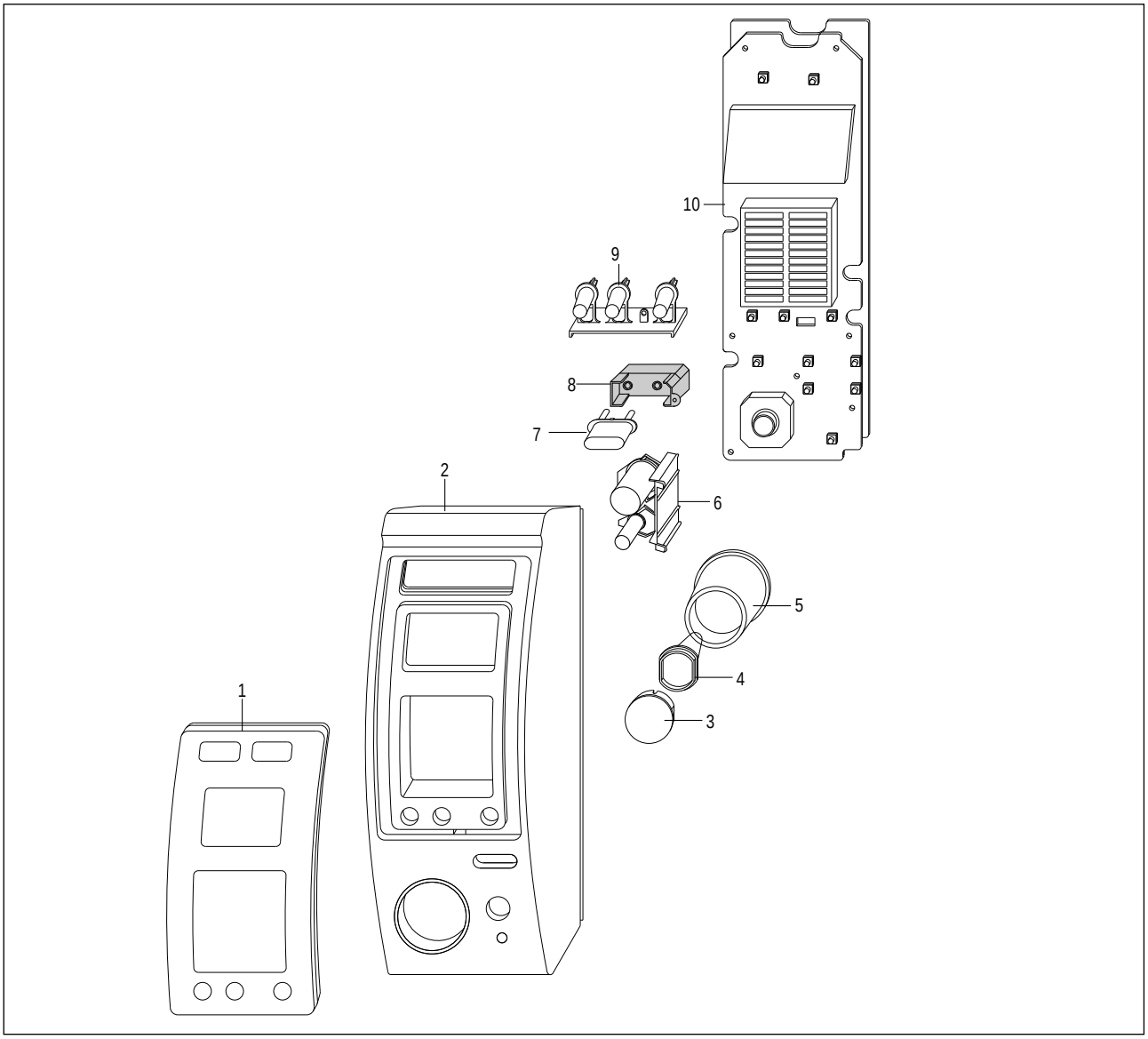
● : Option Parts ⚠ : Warning ⚠ :Electrostatically Sensitive Devices

## 8-2 Door Parts List




| Ref. No. | Parts No. | Description/Specification | Q'ty | Remarks |
|---|---|---|---|---|
| 1 | DE64-40077A | DOOR-A;ABS NTR 160G RE-642 | 1 | ● ⚠ |
| 2 | DE67-20066I | SCREEN-DOOR(B);TEMP-GLASS T4.0 W256.8 L352.5 | 1 | ● ⚠ |
| 3 | DE64-40076A | DOOR-SUB;PC NTR 140G RE-642 | 1 | ● |
| 4 | DE92-50001A | ASSY DOOR-E;SELANT BLK RE-642 | 1 | ● |
| 5 | DE64-40041A | DOOR-C;PP-A353 BLK MW5630T | 1 | |
| 7 | DE64-40175A | DOOR-KEY;POM(TC3005) BLK 13G RE-330 | 1 | |
| 8 | DE61-70027A | SPRING-KEY;HSW3 PI0.6 D5 BLUING | 1 | |
| 9 | DE60-60008B | PIN-HINGE;PI4 L15 NYLON#66 M301TBC NTR | 2 | |
| 10 | DE68-10001A | LABEL-BRAND;AL SAMSUNG S/S 8.0 50 | 1 | ● |

## 8-3 Control Parts List



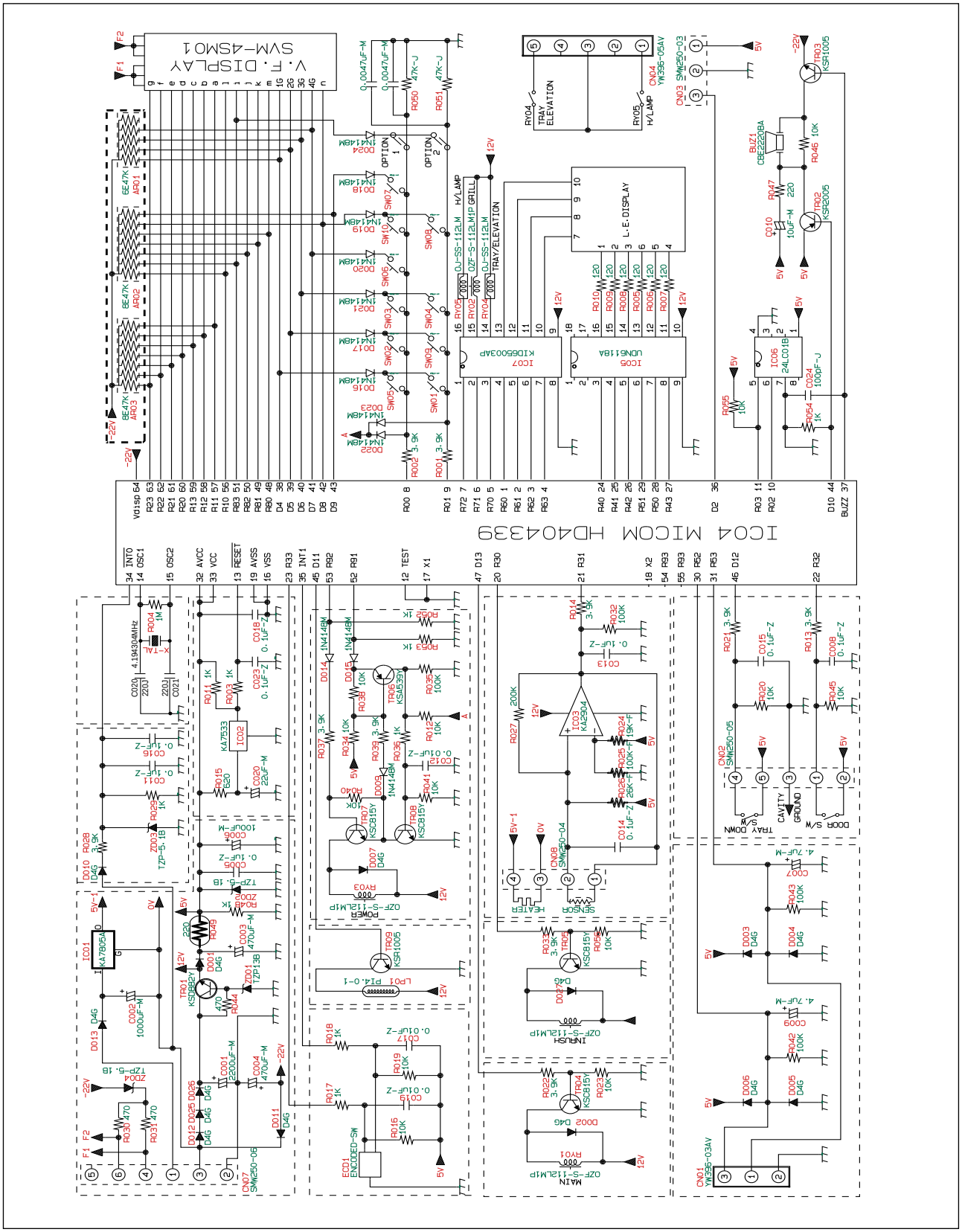

| Ref. No. | Parts No. | Description/Specification | Q'ty | Remarks |
|---|---|---|---|---|
| 1 | DE71-60003M | COVER-PANEL;ABS 2 86.7 186.6 | 1 | ● |
| 2 | DE72-70087K | CONTROL-PANEL;ABS 180G P/WHT CE979GSE | 1 | ● ⚠ |
| 3 | DE66-20091F | BUTTON-START;ABS(LG) SMOG-GRY 3G CE979GSE | 1 | |
| 4 | DE71-60177A | COVER-LAMP;POM T1.5 4G | 1 | |
| 5 | DE64-10049A | KNOB-COVER;ABS NTR 9G RE-642 | 1 | |
| 6 | DE66-20065A | BUTTON-SELECT-D;PC NTR 5G RE-642 | 1 | |
| 7 | DE66-20069A | BUTTON-SELECT-C;PC NTR 6G RE-642 | 1 | |
| 8 | DE66-20064A | BUTTON-CAP;ABS NTR 6G RE-642 | 1 | |
| 9 | DE66-20066A | BUTTON-SELECT-B;PC NTR 6G RE-642 | 1 | |
| 10 | DE91-10427A | ASSY P.C.B-MAIN;AC230V/60HZ S V.F.D CE979GSE | 1 | ⚠ |
| 11 | | ASSY COVROL-BOX;230V50HZ CE979GSE AMFO | 1 | ● ⚠ |

## 8-4 Standard Parts List

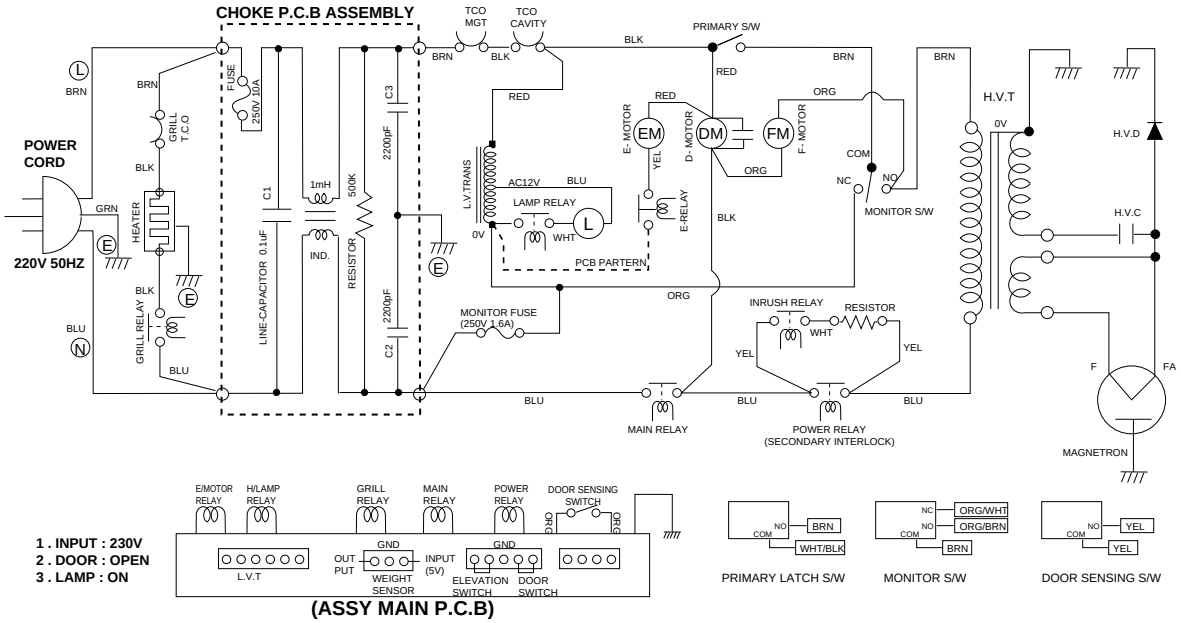
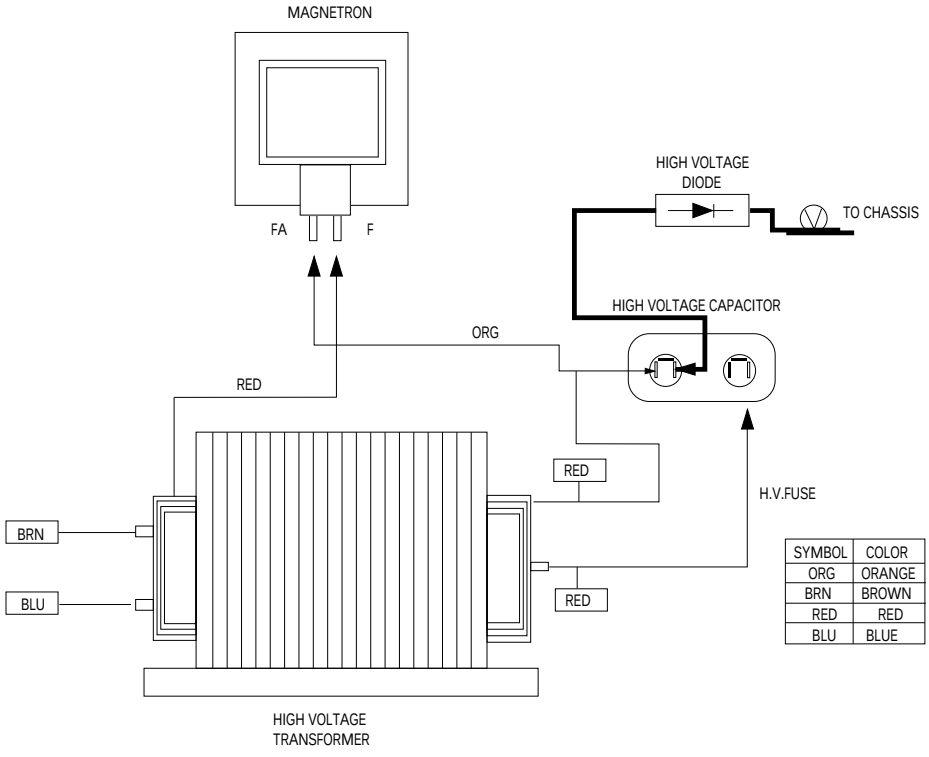
| Parts No. | Description / Specification | Q'ty | Remarks |
|---|---|---|---|
| DE60-20014A | BOLT-FLANGE;M5 L10 MSWR3 FEFZY | 2 | HI-UPP |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 5 | OUT-PN |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 3 | DECO |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 2 | BD-LA |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 2 | B/UPP |
| DE60-20014A | BOLT-FLANGE;M5 L10 MSWR3 FEFZY | 2 | HI-LOW |
| DE60-10052A | SCREW-TAP PH;PH M4 L8 FEFZY | 1 | B/HI-UP |
| DE60-10080A | SCREW-WASHER;M5 L12 2S | 4 | HVTEIL |
| DE60-10080A | SCREW-WASHER;M5 L12 2S | 4 | MGTEIL |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 1 | SU-MGT |
| DE60-10122A | SCREW-TAP TH;TAP TH 2-4X8 FE FN | 1 | A/LAMP |
| DE60-10122A | SCREW-TAP TH;TAP TH 2-4X8 FE FN | 2 | B/HEAT |
| DE02-00029A | TAPE-SCOTCHPAR;POLYESTER 3M-893 W50 | 1 | |
| DE60-10003A | SCREW-TAPPING;TH + 2S M(4) L(6) STS410 N | 2 | P-CEIL |
| DE60-10098A | SCREW-ASSY TAPTITE;PH TC M4X8 SWRCH18A Z | 5 | M/GEAR |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 1 | HVC |
| DE60-10072A | SCREW-TAP TH;TH M4 L16 FEFZY 2-SLOT | 4 | FOOT |
| DE60-10045A | SCREW-TAP PH;PH M3 L6 FEFZY | 1 | SENSOR |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 8 | BAS-P |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 1 | CLAMP |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 1 | CV/AIR |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 2 | CON-BX |
| DE60-10018A | SCREW-ASSY MACHINE;PH M4X0.7P 8 MSWR10 S | 2 | B/EATH |
| DE60-10046A | SCREW-TAP PH;PH M3 L8 FEFZY | 2 | MGT-TC |
| DE60-10082H | SCREW-A;2S-4X12 TOOTHED | 2 | AIR/G |
| DE60-10012A | SCREW-TAP TITE;TH + 3 M4 L10 SWR10 ZPC2 | 1 | MEM-PN |
| DE60-10012A | SCREW-TAP TITE;TH + 3 M4 L10 SWR10 ZPC2 | 1 | NO-FIL |
| DE60-10012A | SCREW-TAP TITE;TH + 3 M4 L10 SWR10 ZPC2 | 1 | P-CO-E |
| DE60-10013A | SCREW-ASSY TAP;TH 2S 4 L12 MSWR3 ZPC3 FI | 4 | MO/FAN |

# 9. P.C.B Diagrams

## 9-1 P.C.B Diagrams



## 9-2 P.C.B Parts List

| Parts No. | Description / Specification | Q'ty | Remarks |
|---|---|---|---|
| 1003-001033 | IC-SOURCE DRIVER;TD62781AP,DIP,18P,300MIL,OCTAL | 1 | |
| 3501-001007 | RELAY-POWER;12Vdc,200mW,5A,1FormA,8mS,4mS | 2 | RY05,RY06 |
| 3710-000132 | CONNECTOR-SOCKET;12P,1R,2.5mm,STRAIGHT,SN | 2 | CN09,CN10 |
| DE07-10055A | V.F.DISPLAY;SVM-4SM01,MWO | 1 | VFD1 |
| DE07-20135A | LED DISPLAY;LTA-2B01G-07,GRN,4,16,60X65,EU | 1 | DSP1 |
| DE07-90019A | LAMP-PILOT;PI4.0-1,DC12V,60MA,ORG,DI4.1,L | 1 | LP01 |
| DE13-20016A | IC-VOLT REGU;KA7805A,TO-220AB,1A,0/125C | 1 | IC01 |
| DE13-20017A | IC-DRIVE;KID65003AP,DIP,16P,STICK,TR-AR | 1 | IC07 |
| DE30-20016A | BUZZER;CBE2220BA,STICK | 1 | BUZ1 |
| DE32-10034A | FUSE;FSF,250V,2A,20MM,50F | 1 | - |
| DE34-20071A | SWITCH-ROTARY;DC10V,1MA,SH,PA-1005A-003-000 | 1 | ECD1 |
| DE37-90020A | CONNECTOR ASSY;YJN25012,PLATE,73MM,WHT | 2 | CN05,CN06 |
| DE47-40024A | HOLDER-FUSE;FH-51H,7.5A | 1 | FUSE1 |
| DE61-90161A | HOLDER-DIGITRON;NYLON,T1.5,#6,BLK | 1 | - |
| DE91-20458A | ASSY PCB AUTO-MAIN;AC230V/50HZ,CE979GSE | 1 | - |
| 0401-001002 | DIODE-SWITCHING;1N4148M,100V,200mA,500mW,3nS,D | 12 | D009,D014~D024 |
| 0402-000559 | DIODE-RECTIFIER;D4G,400V,1A,T-1 | 10 | D001,D002,D007,D010~D013,D025~D027 |
| 0403-000150 | DIODE-ZENER;1N4743A,13V,5%,1W,DO-41,TP | 1 | ZD01 |
| 0403-000525 | DIODE-ZENER;1N4733A,5.1V,5%,1W,DO-41,TP | 3 | ZD02~ZD04 |
| 0501-000283 | TR-SMALL SIGNAL;KSA539,PNP,400mW,TO-92,TP,120- | 1 | TR06 |
| 0501-000388 | TR-SMALL SIGNAL;KSC815,NPN,400mW,TO-92,BK,120- | 4 | TR04,TR05,TR07,TR08 |
| 0502-000303 | TR-POWER;KSD882,NPN,1W,TO-126,TP,160-32 | 1 | TR01 |
| 0504-001014 | TR-DIGITAL;KSR1005,NPN,300mW,4.7K-10K,TO- | 2 | TR03,TR09 |
| 0504-001015 | TR-DIGITAL;KSR2005,PNP,300mW,4.7K-10K,TO- | 1 | TR02 |
| 2001-000004 | R-CARBON;200Kohm,5%,1/8W,AA,TP,1.8x3.2m | 1 | R027 |
| 2001-000273 | R-CARBON;100Kohm,5%,1/8W,AA,TP,1.8x3.2m | 2 | R032,R035 |
| 2001-000290 | R-CARBON;10Kohm,5%,1/8W,AA,TP,1.8x3.2mm | 7 | R012,R016,R019,R020,R023,R034,R038 |
| 2001-000290 | R-CARBON;10Kohm,5%,1/8W,AA,TP,1.8x3.2mm | 6 | R040,R041,R045,R046,R055,R056 |
| 2001-000323 | R-CARBON;120ohm,5%,1/4W,AA,TP,2.4x6.4mm | 6 | R005~R010 |
| 2001-000429 | R-CARBON;1Kohm,5%,1/8W,AA,TP,1.8x3.2mm | 5 | R003,R011,R017,R018,R028, |
| 2001-000429 | R-CARBON;1Kohm,5%,1/8W,AA,TP,1.8x3.2mm | 6 | R029,R036,R048,R052~R054 |
| 2001-000435 | R-CARBON;1Mohm,5%,1/8W,AA,TP,1.8x3.2mm | 1 | R004 |
| 2001-000515 | R-CARBON;220ohm,5%,1/8W,AA,TP,1.8x3.2mm | 1 | R047 |
| 2001-000613 | R-CARBON;3.9Kohm,5%,1/8W,AA,TP,1.8x3.2m | 7 | R001,R002,R013,R014,R021,R022,R033 |
| 2001-000613 | R-CARBON;3.9Kohm,5%,1/8W,AA,TP,1.8x3.2m | 2 | R037,R039 |
| 2001-000780 | R-CARBON;470ohm,5%,1/8W,AA,TP,1.8x3.2mm | 3 | R030,R031,R044 |
| 2001-000786 | R-CARBON;47Kohm,5%,1/8W,AA,TP,1.8x3.2mm | 2 | R050,R051 |
| 2001-000904 | R-CARBON;620ohm,5%,1/8W,AA,TP,1.8x3.2mm | 1 | R015 |
| 2003-000220 | R-METAL OXIDE;220ohm,5%,1W,AA,TP,4.3x12mm | 1 | R049 |
| 2004-000195 | R-METAL;100Kohm,1%,1/8W,AA,TP,1.8x3.2m | 1 | R025 |
| 2004-001976 | R-METAL;19Kohm,1%,1/8W,AA,TP,1.8x3.2mm | 1 | R024 |
| 2004-001977 | R-METAL;26Kohm,1%,1/8W,AA,TP,1.8x3.2mm | 1 | R026 |
| 2201-000144 | C-CERAMIC,DISC;100pF,5%,50V,CH,TP,8x3,5 | 1 | C024 |
| 2202-000127 | C-CERAMIC,MLC-AXIAL;10nF,+80-20%,25V,Y5V,TP,-,7.5 | 2 | C017,C019 |
| 2202-000780 | C-CERAMIC,MLC-AXIAL;100nF,+80-20%,50V,Y5V,TP,3.5x1 | 8 | C005,C008,C013~C016,C018,C023 |
| 2401-000150 | C-AL;1000uF,20%,25V,GP,TP,10x16,5 | 1 | C002 |
| 2401-000247 | C-AL;100uF,20%,10V,GP,-,6.3x11mm,5m | 1 | C006 |
| 2401-000466 | C-AL;10uF,20%,35V,GP,TP,5x7,5 | 1 | C010 |
| 2401-000725 | C-AL;2200uF,20%,35V,GP,-,16x25mm,7. | 1 | C001 |
| 2401-000914 | C-AL;22uF,20%,16V,-,TP,5x11,5mm | 1 | C020 |
| 2401-001412 | C-AL;470uF,20%,35V,GP,TP,10x16,5mm | 1 | C004 |
| 2802-000161 | RESONATOR-CERAMIC;4MHz,0.5%,TP,10.0x5.0x7.5mm | 1 | XTAL |
| 3404-000282 | SWITCH-TACT;12Vdc,50mA,120+-30gf,6.2x3.6mm | 10 | SW01~SW10 |
| 3711-000262 | CONNECTOR-HEADER;1WALL,5P,1R,3.96mm,ANGLE,SN | 1 | CN04 |
| 3711-000881 | CONNECTOR-HEADER;BOX,3P,1R,2.5mm,STRAIGHT,SN | 1 | CN03 |
| 3711-000940 | CONNECTOR-HEADER;BOX,4P,1R,2.5mm,STRAIGHT,SN | 1 | CN08 |
| 3711-000999 | CONNECTOR-HEADER;BOX,5P,1R,2.50mm,STRAIGHT,SN | 1 | CN02 |
| 3711-001038 | CONNECTOR-HEADER;BOX,6P,1R,2.5mm,STRAIGHT,SN | 1 | CN07 |
| DE09-30227A | IC-MCU;24LC01B/P,DIP,DIP,EEPROM | I | C06 ⚠ |
| DE13-20007A | IC-OP AMP;KA2904,DIP | 1 | IC03 ⚠ |
| DE13-20009A | IC;KA7533,DIP, | 1 | IC02 ⚠ |
| DE39-60001A | WIRE-SO COPPER;PI0.6,SN,T,52MM,TAPING_WIRE | 62 | J003~J059,J061~J063,J065~J067 |

# 10. Schematic Diagrams